Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).	**Complete if Known**	
FEE TRANSMITTAL **For FY 2006**	Application Number	10/812,347
	Filing Date	March 30, 2004
	First Named Inventor	FUMIHIKO HIGUCHI
☐ Applicant claims small entity status. See 37 CFR 1.27	Examiner Name	CHEN, Kin C.
	Art Unit	1765
TOTAL AMOUNT OF PAYMENT (\$) 620.00	Attorney Docket No.	071469-0307558

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account   Deposit Account Number: __033975__   Deposit Account Name: PILLSBURY WINTHROP SHAW PITTMAN LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

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FEE CALCULATION (All the fees below are due upon filing or may be subject to a surcharge.)

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
Application Type	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fees Paid (\$)
Utility	300	150	500	250	200	100	_____
Design	200	100	100	50	130	65	_____
Plant	200	100	300	150	160	80	_____
Reissue	300	150	500	250	600	300	_____
Provisional	200	100	0	0	0	0	_____

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
_____ - 20 or HP =	_____	x _____	= _____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)
_____ - 3 or HP =	_____	x _____	= _____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims

Fee (\$)	Fee Paid (\$)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____ - 100 =	_____ / 50 =	_____ (round up to a whole number) x	250.00 =	0.00

4. OTHER FEE(S)

	Fees Paid (\$)
Non-English Specification, \$130 fee (no small entity discount)	
Other (e.g., late filing surcharge): Appeal Brief and Extension of Time	620.00

SUBMITTED BY

Signature	*[signature]*	Registration No. (Attorney/Agent)	47641	Telephone	703.770.7788
Name (Print/Type)	E. Hernandez			Date	March 7, 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE
BOARD OF PATENT APPEALS AND INTERFERENCES

IN RE PATENT APPLICATION OF:	**HIGUCHI** *et al.*
SERIAL NO.:	**10/812,347**
ATTORNEY DOCKET NO:	071469-0307558
FILING DATE:	March 30, 2004
ART UNIT :	1765
EXAMINER	CHEN, KIN C.
FOR:	TOKYO ELECTRON LIMITED

- APPEAL BRIEF UNDER 37 C.F.R. §41.37 -

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Date: March 7, 2006

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Dear Sir:

Further to the Notice of Appeal, filed on December 7, 2006, the Notice of Panel Decision from Pre-Appeal Brief Review dated January 9, 2007, and the Final Office Action of June 7, 2006, Appellants respectfully submit this Appeal Brief pursuant to 37 C.F.R. §41.37, the date for submitting being set by the Notice of Panel decision to January 9, 2007 and being extended by one (1) month by to March 9, 2006, by the corresponding petition and fee.

The Director is authorized to charge the $500.00 fee for filing an Appeal Brief pursuant to 37 C.F.R. §41.20(b)(2). The Director is further authorized to charge any additional fees that may be due, or credit any overpayment of same to Deposit Account No. **03-3975** (Ref. No. 071469-0307558).

- REQUIREMENTS OF 37 C.F.R. § 41.37 -

I.   37 C.F.R. § 41.37(c)(1)(i) – REAL PARTY IN INTEREST

The real party in interest for this Appeal and the present application is TOKYO ELECTRON LIMITED by way of an Assignment recorded in the U.S. Patent Trademark Office at Reel/Frame: 015505/0347.

II.   37 C.F.R. § 41.37(c)(1)(ii) - RELATED APPEALS AND INTERFERENCES

There are presently no appeals or interferences known to the Appellants, the Appellants' representatives or the Assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III.   37 C.F.R. § 41.37(c)(1)(iii) - STATUS OF CLAIMS

Pending: Claims 1-22 and 24-30 are pending.

Withdrawn: Claim 30 has been withdrawn.

Rejected: Claims 1-22 and 24-29 stand rejected.

Cancelled: Claim 23 has been cancelled.

Allowed: No claims have been allowed.

On Appeal: Claims 1-22 and 24-29 are being appealed.   Of the claims on Appeal, claims 1, 12, and 29 are the sole independent claims. The claims on Appeal are set forth in the attached Appendix.

IV.   37 C.F.R. § 41.37(c)(1)(iv) - STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Office Action of June 7, 2006.

V.   37 C.F.R. § 41.37(c)(1)(v) - SUMMARY OF CLAIMED SUBJECT MATTER

Independent claims 1, 12, and 29, as described below, include references and citations to the specification, drawings, and reference numerals. Such description is intended to facilitate an understanding of the claims by the Board Members and is not intended as a comprehensive claim construction, such as used in the context of an argument of invalidity or infringement. Any reference to more than one reference number or character for any particular claimed element or limitation *is illustrative only and is not to be construed as an admission* that the claims are limited to any, or all, of the particularly disclosed embodiments.

Independent claim 1, as it currently stands, sets forth the following:

1. A method for achieving a trim amount of a feature on a substrate in a chemical oxide removal process (*FIG. 15: item 800, page 22 line 24 – page 24, line 24; see also, page 6, lines 16-21; page 24, lines 25-34*) comprising:

setting a process recipe for said chemical oxide removal process (*FIG. 15: item 820, page 22, line 33 – page 23, line 22; see also, page 29, lines 27-28*), wherein said setting said process recipe comprises setting an amount of a first process gas, and setting an amount of a second process gas (*page 26, lines 15-20; see also, page 29, lines 29-33*);

determining a relationship between a trim amount of said feature and an amount of an inert gas (*FIG. 16; page 26, lines 28-29; see also, page 27, lines 3-15; FIG. 17, page 26, lines 16-20; page 29, lines 25-26*), wherein said relationship is established for an amount of a first process gas, and an

amount of a second process gas (*page 26, lines 29-31; see also, page 27, lines 10-15*);

adjusting said process recipe for said chemical oxide removal process in order to achieve said trim amount by setting an amount of the inert gas (*page 30, lines 10-13*);

chemically treating said feature on said substrate by exposing said substrate using said process recipe (*page 23, lines 23-25*); and

substantially removing said trim amount from said feature (*page 6, lines 16-21; see also, page 24, lines 25-34*), wherein said determining said relationship includes curve-fitting either said trim amount data as a function of said amount of said inert gas or said amount of said inert gas as a function of said trim amount data (*page 27, lines 3-7; see also, page 30, lines 1-9; page 30, line 32 – page 31, line 4*).

Independent claim 12, as it currently stands, sets forth the following:

12. A method for trimming a feature on a substrate using a chemical oxide removal process (*FIG. 15: item **800**, page 22 line 24 – page 24, line 24; see also, page 6, lines 16-21; page 24, lines 25-34*) comprising:

determining a relationship between a trim amount of said feature and an amount of an inert gas (*FIG. 16; page 26, lines 28-29; see also, page 27, lines 3-15; FIG. 17, page 26, lines 16-20; page 29, lines 25-26*), wherein said

relationship is established for an amount of a first process gas, and an amount of a second process gas (*page 26, lines 29-31; see also, page 27, lines 10-15*);

selecting a target trim amount (*page 27, lines 16-18; Table 2*);

selecting a target amount of inert gas for achieving said target trim amount using said relationship (*page 27, lines 16-18; Table 2; page 28, lines 1-6*);

chemically treating said feature on said substrate by exposing said substrate to said amount of said first process gas, said amount of said second process gas, and said target amount of said inert gas (*page 23, lines 23-25; page 26, lines 15-28*); and

substantially removing said target trim amount from said feature (*page 6, lines 16-21; see also, page 24, lines 25-34*), wherein said determining said relationship includes curve-fitting either said trim amount data as a function of said amount of said inert gas or said amount of said inert gas as a function of said trim amount data (*page 27, lines 3-7; see also, page 30, lines 1-9; page 30, line 32 – page 31, line 4*).

Independent claim 29, as it currently stands, sets forth the following:

29.   A method for achieving a trim amount of a silicon oxide feature on a substrate in a chemical oxide removal process (*FIG. 15: item 800, page 22*

line 24 – page 24, line 24; see also, page 6, lines 16-21; page 24, lines 25-34)

comprising:

setting a process recipe for said chemical oxide removal process (*FIG.*

15: item 820, page 22, line 33 – page 23, line 22; see also, page 29, lines 27-28),

wherein said setting said process recipe comprises setting an amount of

HF, and setting an amount of NH_3 (*page 26, lines 15-20; see also, page 29,*

lines 29-33);

adjusting said process recipe for said chemical oxide removal process

in order to achieve said trim amount by setting an amount of argon (*page*

30, lines 10-13);

chemically treating said feature on said substrate by exposing said

substrate using said process recipe (*page 23, lines 23-25; page 26, lines 15-*

28), wherein said amount of HF is introduced independently from said

amount of said NH_3, and said amount of argon is introduced with said

amount of NH_3 (*page 26, lines 21-28*); and

substantially removing said trim amount from said feature (*page 6, lines*

16-21; see also, page 24, lines 25-34), wherein increasing said amount of

argon corresponds to decreasing said trim amount (*page 26, lines 26-28*).

VI.   37 C.F.R. § 41.37(c)(1)(vi) - GROUNDS OF REJECTION TO BE REVIEWED

The grounds of rejection submitted for review are those identified in the Final Office Action, as follows:

(a) the rejections of claims 1-22 and 24-29, under 35 U.S.C. §103(a), as allegedly being unpatentable over Tomoyasu '583 (U.S. Patent Application Publication 2004/0185583 A1);

(b) the rejections of claims 1, 4-8, 10-12, 15-19, 21-22, and 24-28, under 35 U.S.C. §103(a), as allegedly being unpatentable over Newton '377 (U.S. Patent Application Publication 2004/0099377 A1);

(c) the rejections of claims 1, 4-12, 15-22, and 24-29, under 35 U.S.C. §103(a) over Natzle '047 (U.S. Patent Application Publication 2004/0097047 A1) in view of Newton '377; and

(d) the rejections of claims 2-3 and 13-14, under 35 U.S.C. §103(a) over Natzle '047 in view Newton '377 and Doris '981 (U.S. Patent Application Publication 2004/0241981 A1).

VII.   37 C.F.R. § 41.37(c)(1)(vi) - ARGUMENT

To be clear and to the point, the prior art rejections are improper and must fail for two reasons. First, the Examiner has not presented a *prima facie* case of obviousness with respect to the claims. Second, none of the asserted references, whether taken alone or in combination, teach or suggest the entire claimed combination of elements. Accordingly, Appellants respectfully traverse the rejections set forth by the Examiner.

As a preliminary matter, Appellants respectfully point out that "[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there *must be some suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) *must teach or suggest all the claim limitations*." (*See,* M.P.E.P. §2143)(*emphasis added*). As a corollary to this requirement,

the Federal Circuit has specifically held that the mere fact that *the prior art could be modified* as proposed by the Examiner *is not sufficient* to establish a *prima facie* case of obviousness. (*See, In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (*emphasis added*). Rather, the Examiner *must explain why the prior art would have suggested* to one of ordinary skill in the art *the desirability of the modification*. (*See Fritch*, 972 F.2d at 1266, 23 USPQ2d at 1783-84) (*emphasis added*). As will be evident by the following discussion, Appellants respectfully submit that a *prima facie* case of obviousness has not been established.

Appellants further submit that, at the very least, none of the asserted references teach or suggest (a) determining a *relationship between a trim amount and an amount of an inert gas,* wherein the relationship is established for an amount of a first process gas and a second process gas, and (b) that the relationship is determined via curve-fitting either the *trim amount data as a function of the amount of the inert gas or the amount of the inert gas as a function of the trim amount data*, as required by claims 1 and 12.

Nor is there anything in the asserted references that teach or suggest (a) adjusting the process recipe for the chemical oxide removal process in order *to achieve the trim amount by setting an amount of argon,* (b) chemically treating the feature on the substrate by exposing the substrate using the process recipe, *wherein the amount of HF is introduced independently from the amount of the NH_3, and the amount of argon is introduced with the amount of NH_3,* and (c) substantially removing the trim amount from the feature, wherein *increasing the amount of argon corresponds to decreasing the trim amount*, as required by claim 29.

A. Claims 1-22 and 24-29 Are Not Obvious Over Tomoyasu '583

The Examiner asserted that Tomoyasu '583 renders claims 1-22 and 24-29 unpatentable as the reference allegedly teaches or suggests each and every claim element. Appellants respectfully submit that these rejections are woefully unsupported.   In

particular, the grounds of rejections rest squarely on the Examiner's assertions that Tomoyasu '583 teaches setting an amount of an inert gas in order to achieve the trim amount (Tomoyasu '583: par. [0007]) and teaches adjusting the amount of inert gas in order to remove the desired amount of chemical oxide (Tomoyasu '583: par. [0007], [0074]). (*See*, Final Office Action, pages 3-4). The Examiner further asserted that Tomoyasu '583 teaches the use of the claimed gases and combinations thereof and that the reference shows that process parameters and compositions of chemical treatment gases are result-effective variables, which are obvious to artisans of ordinary skill. (*See*, Final Office Action, pages 9-10). Such assertions are either inaccurate or simply miss the point.

In particular, Tomoyasu '583 teaches a processing subsystem **150** that includes a Chemical Oxide Removal (COR) module **154** and a Post Heat Treatment (PHT) chamber **156**. The COR module **154** performs the first step of the COR process, which is a reaction between a mixture of process gases, such as HF and ammonia gases, and silicon dioxide that forms a solid reaction product on the wafer surface. The PHT module **156**, performs the second step of the COR process, which causes the evaporation of the solid reaction product by heating the wafer. (*See*, Tomoyasu '583: par. [0052]).

Tomoyasu '583 further discloses that a predicted state for the wafer may be computed based on the input state, the process characteristics, and a process model. For example, a trim rate model can be used along with a processing time to compute a predicted trim amount. Alternately, an etch rate model can be used along with a processing time to compute an etch depth, and a deposition rate model can be used along with a processing time to compute a deposition thickness. Other models identified by Tomoyasu '583 include SPC charts, PLS models, PCA models, FDC models, and MVA models. (*See*, Tomoyasu '583: par. [0074]).

With regard to the use of inert gases, and in glaring contrast to the Examiner's cited passages, the few instances in which Tomoyasu '583 actually mentions the use of an "inert

gas" (*e.g.*, argon) is in connection with the orifice configurations of the gas distribution system and the possible use of a heat transfer gas. That is, <u>Tomoyasu '583</u> discloses that the first and second arrays of one or more orifices **1444, 1448** are configured to distribute gas, which can, for example, comprise NH_3, HF, H_2, O_2, CO, CO_2, Ar, He, *etc.* (*see,* <u>Tomoyasu '583</u>: par. **[0200]**) and that a heat transfer gas may be delivered to the back-side of substrate **1242** via a backside gas system to improve the gas-gap thermal conductance between substrate **1242** and substrate holder **1240** (*see,* <u>Tomoyasu '583</u>: par. **[0195]**). The heat transfer gas supplied to the back-side of substrate **1242** can comprise an inert gas such as helium, argon, xenon, krypton, a process gas such as CF_4, C_4F_8, C_5F_8, C_4F_6, *etc.*, or other gas such as oxygen, nitrogen, or hydrogen.

It should be clear that such teachings have nothing to do with determining the relationship between a trim amount and *an amount of an inert gas*, as required by claims 1 and 12. There is nothing in the brief discussion that could possibly lead those skilled in the art to understand or determine the relationship between the trim amount and the amount of an inert gas, among other features. It is the absence of a discussion or suggestion of a nexus or connection between these parameters, among others, that clearly undermine the Examiner's assertions.

Moreover, with regard to the <u>Tomoyasu '583</u> trim rate models used to compute predicted trim amount, there is, once again, nothing to suggest that these models are based on any relationship other than trim amounts and processing "reactive" gases (*i.e.*, HF or NH_3). As such, <u>Tomoyasu '583</u> cannot be construed as teaching a relationship between a trim amount and an amount of *an inert gas* – much less, that the relationship is determined via curve-fitting either the trim amount data as a function of *the amount of the inert gas* or *the amount of the inert gas* as a function of the trim amount data, as also required by claims 1 and 12.

For at least similar reasons, <u>Tomoyasu '583</u> fails to teach adjusting the process recipe for the chemical oxide removal process in order to achieve the trim amount by setting *an amount of argon* and substantially removing the trim amount from the feature, wherein *increasing the amount of argon* corresponds to decreasing the trim amount, as required by claim 29. As noted above, argon is mentioned as a possible heat transfer gas, but in no way does <u>Tomoyasu '583</u> relate it to achieving a trim amount.

Moreover, as best understood, there is nothing in <u>Tomoyasu '583</u> that specifically teaches chemically treating the feature on the substrate by exposing the substrate using the process recipe, wherein the amount of HF is introduced independently from the amount of the NH_3, *and the amount of argon is introduced with the amount of NH_3*, as required by claim 29.

For at least these reasons, Appellants submit that the Examiner has not presented a *prima facie* case of obviousness with respect to independent claims 1, 12, and 29 and that these claims are not rendered obvious by <u>Tomoyasu '583</u>. As such, claims 1, 12, and 29 are clearly patentable. Moreover, because claims 2-11 and claims 13-22, 25-28 depend from claims 1 and 12, respectively, claims 2-11 and claims 13-22, 25-28 are also patentable at least by virtue of dependency as well as for their additional recitations.

B. Claims 1, 4-8, 10-12, 15-19, 21-22, & 24-28 Are Not Obvious Over <u>Newton '377</u>

The Examiner asserted that <u>Newton '377</u> renders claims 1, 4-8, 10-12, 15-19, 21-22, and 24-28 unpatentable by alleging that the reference teaches or suggests each of the claimed elements, including determining a *relationship between a trim amount and an amount of an inert gas* and that the relationship is determined via curve-fitting either the *trim amount data as a function of the amount of the inert gas or the amount of the inert gas as a function of the trim amount data*, as required by claims 1 and 12. Appellants strenuously disagree.

Newton '377 is directed to an apparatus and method that provides controlled etching of an adapted surface layer of a workpiece or wafer by reaction of the adapted surface layer with ammonium bifluoride (NH_5F_2), forming a self-limiting etchable layer, ammonium hexafluorosilicate, (($NH_4)_2SiF_6$), that may be removed by thermal desorption, in which NH_5F_2 may be formed by mixing a first fluid, ammonia (NH_3) and a second fluid, hydrogen fluoride (HF). (*See*, Newton '377: par. **[0026]**).

Newton '377 discloses a chamber **7** that includes a sandwich **119** of an electrostatic chuck **110**, and upper annular ring **103**, a cathode insulator **105**, and a lower annular ring **125** that contains a plurality of exhaust holes **127** for distributing an exhaust flow provided by a vacuum pump through the exhaust port **83**. The exhaust flow that originates from the exhaust port **83** and distributed through the plurality of exhaust holes **127** of the lower annular ring **125**, resulting in a uniform or homogeneous atmosphere of reactive fluids over the workpiece **30** in the chamber **7**. (*See*, Newton '377: par. **[0050]**; FIG. 4).

Newton '377 further discloses that "reactive fluids" refer to the first fluid, the second fluid, in which the first or second fluids may be ammonia (NH_3) or hydrogen fluoride (HF) and ammonium bifluoride (NH_5F_2) and combinations thereof. Providing the reactive fluids over the adapted surface layer **32** of the workpiece **30**, as a uniform or homogeneous atmosphere, forms the self-limiting etchable layer **50** that includes layers made of materials such as ammonium hexafluorosilicate (($NH_4)_2SiF_6$), that may become impervious to continued exposure to hydrogen fluoride (HF). Such imperviousness is the basis for the layer **50** being a self-limiting etchable layer. (*See*, Newton '377: par. **[0050]**; FIG. 4).

Regarding the use of inert gases, Newton '377 merely discloses that fluid feed lines **97, 99** or chamber **7** may be optionally provided with Ar or N_2 gas. (*See*, Newton '377: par. **[0034]**, **[0073]**). Appellants remain at a loss as to how the mere mention of these gases that would somehow lead those skilled in the art to understand or determine the

nature of the relationship between the trim amount and the amount of an inert gas, among other features.   There is simply nothing in Newton '377 that suggests determining a relationship between a trim amount and *an amount of an inert gas* and that the relationship is determined via curve-fitting either the trim amount data as a function of *the amount of the inert gas or the amount of the inert gas* as a function of the trim amount data, as required by claims 1 and 12.

For at least these reasons, Appellants submit that the Examiner has not presented a *prima facie* case of obviousness with respect to independent claims 1 and 12 and that these claims are not rendered obvious by Newton '377. As such, claims 1 and 12 are clearly patentable.   Moreover, because claims 2-11 and claims 13-22, 25-28 depend from claims 1 and 12, respectively, claims 2-11 and claims 13-22, 25-28 are also patentable at least by virtue of dependency as well as for their additional recitations.

C.   Claims 1, 4-12, 15-22, & 24-29 Are Not Obvious Over Natzle '047 & Newton '377

The Examiner alleged that Natzle '047 teaches the use of a process recipe including setting an amount of first and second process gases and acquiring data as a function of variable parameters. The Examiner acknowledged that Natzle '047 fails to teach or suggest the use of inert gas and, therefore, relied on Newton '377 to allegedly render claims 1, 4-12, 15-22, & 24-29 unpatentable. (*See*, Final Office Action: page 7). Appellants strenuously disagree.

For these rejections, Appellants substantially rely on the reasons presented above regarding Newton '377.   In short, Natzle '047 discloses the use of a pre-cleaning step by introducing a CMOS device **10** into a Chemical Oxide Removal (COR) chamber **44**, which employs gas phase reactants (*e.g.*, HF and NH_3) to perform a self-limiting etch that is adjustable by controlling the parameters in the COR chamber **44**. (*See*, Natzle '047: par. [0037]). Natzle '047 further discloses that the completion of the reaction and the amount of the gate dielectric layer **14** and the reoxidized silicon oxide layer **18** that are removed is a

function of the substrate temperature, composition and residence time of the adsorbed reactant film **20**. Factors influencing the amount removed per unit time include the vapor pressure of the reactant at the temperature of the substrate **12**, the amount of reactant or the rate of reactant admitted to the COR chamber **44**, the pumping speed of pump **60**, and the reaction rate between the adsorbed reactant film **20** and the reoxidized silicon oxide layer **18** to be etched. (*See*, Natzle '047: par. [0042]).

However, as admitted by the Examiner, there is nothing in Natzle '047 that remotely teaches or suggests the use of inert gases. And, for the reasons noted above, Newton '377 is incapable of curing these deficiencies. That is, the mere mention of Ar or N_2 gas is simply not enough to defeat patentability, as there is nothing in Newton '377 that suggests determining a relationship between a trim amount and *an amount of an inert gas* and that the relationship is determined via curve-fitting either the trim amount data as a function of *the amount of the inert gas or the amount of the inert gas* as a function of the trim amount data, as required by claims 1 and 12.

For similar reasons, both Natzle '047 and Newton '377 fail to teach adjusting the process recipe for the chemical oxide removal process in order to achieve the trim amount by setting *an amount of argon* and substantially removing the trim amount from the feature, wherein *increasing the amount of argon* corresponds to decreasing the trim amount, as required by claim 29. As noted above, Natzle '047 is silent as to the use of any inert gas, including Ar, and Newton '377 merely mentions optionally providing fluid feed lines or a chamber with Ar. None of these references remotely teach the relationship between the increase in Ar and the decrease in trim amount.

Moreover, as best understood, there is nothing in Natzle '047 and Newton '377 that specifically teach chemically treating the feature on the substrate by exposing the substrate using the process recipe, wherein the amount of HF is introduced independently from the

amount of the NH_3, *and the amount of argon is introduced with the amount of NH_3*, as required by claim 29.

For at least these reasons, Appellants submit, once again, that the Examiner has not presented a *prima facie* case of obviousness with respect to independent claims 1, 12, and 29 and that these claims are not rendered obvious by the combination of Natzle '047 and Newton '377. As such, claims 1, 12, and 29 are clearly patentable. Moreover, because claims 2-11 and claims 13-22, 25-28 depend from claims 1 and 12, respectively, claims 2-11 and claims 13-22, 25-28 are also patentable at least by virtue of dependency as well as for their additional recitations.

D. Claims 2-3 & 13-14 Are Not Obvious Over Natzle '047, Newton '377 & Doris '981

Lastly, the Examiner alleged that the combination of Natzle '047, Newton '377 and Doris '981 teach or suggest each and every element of dependent claims 2-3 and 13-14.

Appellants substantially rely on the reasons presented above regarding the patentability of independent claims 1 and 12. Thus, based on the aforementioned reasons, Appellants respectfully submit that claims 2-3 and 13-14, which depend from claims 1 and 12, respectively, are also patentable at least by virtue of dependency as well as for their additional recitations.

VIII. **37 C.F.R. §41.37(c)(1)(viii) – CLAIMS APPENDIX**
APPENDIX A: The pending claims (claims 1-22 and 24-30) are attached.

IX. **37 C.F.R. §41.37(c)(1)(ix) – EVIDENCE APPENDIX**
APPENDIX B: (NONE)

X. **37 C.F.R. §41.37(c)(1)(x) – RELATED PROCEEDINGS INDEX**
APPENDIX C: (NONE)

XI.   CONCLUSION

For at least the foregoing reasons, it is respectfully submitted that claims 1-29 are not rendered obvious, under 35 U.S.C. §103(a), by the asserted references. Appellants, therefore, respectfully request this Honorable Board to reverse the rejection of these claims and direct that the claims be passed to issue.

Date: **March 7, 2006**   Respectfully submitted,

                                                    By: _____
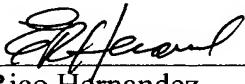
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1. A method for achieving a trim amount of a feature on a substrate in a chemical oxide removal process comprising:

setting a process recipe for said chemical oxide removal process, wherein said setting said process recipe comprises setting an amount of a first process gas, and setting an amount of a second process gas;

determining a relationship between a trim amount of said feature and an amount of an inert gas, wherein said relationship is established for an amount of a first process gas, and an amount of a second process gas;

adjusting said process recipe for said chemical oxide removal process in order to achieve said trim amount by setting an amount of the inert gas;

chemically treating said feature on said substrate by exposing said substrate using said process recipe; and

substantially removing said trim amount from said feature, wherein said determining said relationship includes curve-fitting either said trim amount data as a function of said amount of said inert gas or said amount of said inert gas as a function of said trim amount data.

2. The method of claim 1, wherein said substantially removing said trim amount from said feature comprises thermally treating said substrate by elevating the temperature of said substrate following said chemical treating.

3. The method of claim 1, wherein said substantially removing said trim amount from said feature comprises rinsing said substrate in a water solution following said chemical treating.

4. The method of claim 1, wherein said setting said amount of said first process gas includes setting an amount of HF, and said setting said amount of said second process gas includes setting an amount of NH_3.

5. The method of claim 1, wherein said setting said amount of said inert gas includes setting an amount of argon.

6. The method of claim 1, wherein said chemically treating said feature includes introducing said first process gas independently from said second process gas.

7. The method of claim 1, wherein said setting said process recipe further includes setting a pressure.

8. The method of claim 1, wherein said setting said process recipe further includes setting a temperature of said substrate.

9. The method of claim 1, wherein said setting said process recipe further includes setting a time period for chemically treating said substrate.

10. The method of claim 1, wherein said setting said process recipe further includes setting a temperature of a chemical treatment process for chemically treating said substrate.

11. The method of claim 1, wherein said chemically treating said feature includes chemically treating a silicon oxide feature.

12. A method for trimming a feature on a substrate using a chemical oxide removal process comprising:

determining a relationship between a trim amount of said feature and an amount of an inert gas, wherein said relationship is established for an amount of a first process gas, and an amount of a second process gas;

selecting a target trim amount;

selecting a target amount of inert gas for achieving said target trim amount using said relationship;

chemically treating said feature on said substrate by exposing said substrate to said amount of said first process gas, said amount of said second process gas, and said target amount of said inert gas; and

substantially removing said target trim amount from said feature, wherein said determining said relationship includes curve-fitting either said trim amount data as a function of said amount of said inert gas or said amount of said inert gas as a function of said trim amount data.

13. The method of claim 12, wherein said substantially removing said target trim amount from said feature comprises thermally treating said substrate by elevating the temperature of said substrate following said chemical treating.

14. The method of claim 12, wherein said substantially removing said target trim amount from said feature comprises rinsing said substrate in a water solution following said chemical treating.

15. The method of claim 12, wherein said relationship is established for said amount of said first process gas and said amount of said second process gas includes a relationship for an amount of HF and amount of NH_3.

16. The method of claim 12, wherein said relationship between a trim amount of said feature and an amount of an inert gas includes a relationship between a trim amount of said feature and an amount of argon.

17. The method of claim 12, wherein said chemically treating said feature includes introducing said first process gas independently from said second process gas.

18. The method of claim 12, wherein said relationship is further established for a pressure.

19. The method of claim 12, wherein said relationship is further established for a temperature of said substrate.

20. The method of claim 12, wherein said relationship is further established for a time period of said chemical treating.

21. The method of claim 12, wherein said chemically treating said feature includes chemically treating a silicon oxide feature.

22. The method of claim 12, further comprising:

optimizing said relationship in order to minimize an error in a trim amount, wherein said error in said trim amount is determined from translating a difference between said trim amount data and said relationship into said error in said trim amount using said relationship.

23. (*Cancelled*).

24. The method of claim 12, wherein said curve-fitting comprises fitting with polynomial expressions.

25. The method of claim 24, further comprising:

optimizing said relationship in order to minimize an error in a trim amount, wherein said error in said trim amount is determined from translating a difference between said trim amount data and said relationship into said error in said trim amount using said relationship.

26. The method of claim 25, wherein said optimizing includes adjusting the order of said polynomial expressions.

27. The method of claim 12, wherein said curve-fitting includes curve-fitting two or more process regimes within said trim amount data and said amount of said inert gas.

28. The method of claim 27, wherein said chemically treating said feature includes using a separate mass flow controller for each process regime.

29. A method for achieving a trim amount of a silicon oxide feature on a substrate in a chemical oxide removal process comprising:

setting a process recipe for said chemical oxide removal process, wherein said setting said process recipe comprises setting an amount of HF, and setting an amount of NH_3;

adjusting said process recipe for said chemical oxide removal process in order to achieve said trim amount by setting an amount of argon;

chemically treating said feature on said substrate by exposing said substrate using said process recipe, wherein said amount of HF is introduced independently from said amount of said NH_3, and said amount of argon is introduced with said amount of NH_3; and

substantially removing said trim amount from said feature, wherein increasing said amount of argon corresponds to decreasing said trim amount.

30. (*Withdrawn*): A system for achieving a trim amount on a substrate in a chemical oxide removal process comprising:

a chemical treatment system for altering exposed surface layers on said substrate by exposing said substrate to an amount of a first process gas, an amount of a second process gas, and an amount of an inert gas;

a thermal treatment system for thermally treating said chemically altered surface layers on said substrate; and

a controller coupled to said chemical treatment system and configured to determine a relationship between a trim amount of said feature and said amount of said inert gas, wherein said relationship is established for said amount of said first process gas, and said amount of said second process gas and adjust said amount of said inert gas in order to achieve said trim amount, wherein said determination of said relationship includes curve-fitting either said trim amount data as a function of said amount of said inert gas or said amount of said inert gas as a function of said trim amount data.

- 37 C.F.R. §41.37(c)(1)(ix): APPENDIX B (EVIDENCE APPENDIX) -

(NONE)

- 37 C.F.R. §41.37(c)(1)(x): APPENDIX C (RELATED PROCEEDINGS INDEX) -

(NONE)